FORM PTO-1390 (Modified) (REV 11-2000) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: **112740-544**

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR): **10/070105**

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE00/02794	**17 August 2000**	**17 August 1999**

TITLE OF INVENTION
STANDBY POWER SUPPLY AND ASSOCIATED METHOD

APPLICANT(S) FOR DO/EO/US
Ludger Klein-Reesink et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☒ is attached hereto (required only if not communicated by the International Bureau).
   b. ☐ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☒ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☒ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
8. ☒ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☒ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☒ Certificate of Mailing by Express Mail
23. ☐ Other items or information:

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
10/070105	PCT/DE00/02794	112740-544

24. The following fees are submitted:.	CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :		
☐ Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1040.00**		
☒ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$890.00**		
☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$740.00**		
☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$710.00**		
☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) **$100.00**		
ENTER APPROPRIATE BASIC FEE AMOUNT =	**$890.00**	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).	**$0.00**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	9 - 20 =	0	x	$18.00	**$0.00**
Independent claims	2 - 3 =	0	x	$84.00	**$0.00**
Multiple Dependent Claims **(check if applicable).**			☐		**$0.00**

TOTAL OF ABOVE CALCULATIONS =	**$890.00**	
☐ Applicant claims small entity status. See 37 CFR 1.27). The fees indicated above are reduced by 1/2.	**$0.00**	
SUBTOTAL =	**$890.00**	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +	**$0.00**	
TOTAL NATIONAL FEE =	**$890.00**	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable).** ☐	**$0.00**	
TOTAL FEES ENCLOSED =	**$890.00**	
	Amount to be: refunded	$
	charged	$

a. ☒ A check in the amount of **$890.00** to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **02-1818** A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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SIGNATURE

William E. Vaughan
NAME

39,056
REGISTRATION NUMBER

February 18, 2002
DATE

BOX PCT

IN THE UNITED STATES ELECTED/DESIGNATED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

PRELIMINARY AMENDMENT

APPLICANTS:	Ludger Klein-Reesink et al.	DOCKET NO.:	112740-544
SERIAL NO:		GROUP ART UNIT:	
FILED:		EXAMINER:	
INTERNATIONAL APPLICATION NO::		PCT/DE00/02794	
INTERNATIONAL FILING DATE		17 August 2000	
INVENTION:	STANDBY POWER SUPPLY AND ASSOCIATED METHOD		

Assistant Commissioner for Patents,
Washington, D.C. 20231

Sir:

Please amend the above-identified International Application before entry into the National stage before the U.S. Patent and Trademark Office under 35 U.S.C. §371 as follows:

In the Specification:

Please replace the Specification of the present application, including the Abstract, with the following Substitute Specification:

SPECIFICATION

TITLE OF THE INVENTION

STANDBY POWER SUPPLY AND ASSOCIATED METHOD

BACKGROUND OF THE INVENTION

The present invention relates to a standby power supply and to an associated method and, in particular, to a standby power supply in a telecommunications terminal having a base station and at least one cordless mobile part.

Telecommunications terminals in the form of cordless mobile applications are becoming increasingly important since they allow greater flexibility for the user, with reduced installation complexity. Normally, such telecommunications terminals include a base station which draws its power supply from an electrical mains system and is connected via a communications link (for example, a telephone line) to a communications network. An associated mobile part is preferably cordless, and is connected to the base unit via, for example, a standardized radio interface (for example, DECT).

During normal operation, such a conventional base unit is supplied with power from the electrical mains system, while the mobile part draws its power supply from a mobile power supply, such as a rechargeable energy store. While it is being charged, the mobile part is normally held in the base unit, and is charged via the electrical mains system. However, telecommunications terminals such as these have a disadvantage when it is impossible to supply power from the electrical mains system owing to defects or a power failure. In a case such as this, the base unit cannot set up a link either to the mobile part (or to a large number of mobile parts) or the communications network, so that the communications link is interrupted, or fails.

Thus, in order to maintain a communications link in an emergency as well, the base unit normally has a so-called standby power supply, which ensures that at least the essential functions can be operated.

Figure 1 shows a simplified block diagram of a telecommunications terminal with a standby power supply according to the prior art, as is known, for example, from the document US 5,495,530. The reference symbol 1 in Figure 1 denotes a base unit which is connected to a mobile part 2 via a radio link. The base unit 1 and the mobile

part 2 have a respective antenna AB and AM for this purpose, with an associated transmitting/receiving apparatus (which is not shown). The mobile part 2 has a mobile power supply unit EM for supplying power. This is normally in the form of a rechargeable energy store. In order to charge this mobile power supply unit EM, the mobile part 2 can be connected to a charging interface 3 with an associated charging circuit (which is not shown).

A power supply unit 6, which is connected to an electrical mains system EN via a power supply line 4, is used to supply power to the base unit 1. The electrical mains system EN provides an AC voltage; normally of 115 V or 230 V. The power supply unit 6 converts this voltage to a DC voltage, which is used as the supply voltage for the base unit 1. In this case, the power supply unit 6 may be integrated in the base unit 1, or may be connected as an external power supply unit. A communications link 5 which includes, for example, a/b conductors, is provided for connecting the base unit 1 to a communications network KN. If the power supply line 4 is interrupted, or if the electrical mains system EN fails, a standby power supply for the base unit 1 is, according to Figure 1, derived from the communications link 5 via a standby power supply unit NSV (standby operation).

A standby power supply such as this makes use of the fact that a certain power supply capability is available, as a standby power supply, on the communications link 5 from the communications network KN. In this way, during standby operation, the base unit 1 can be supplied with power, as shown in Figure 1, such that a communications link can be set up from the mobile part 2 to the communications network KN, or from the mobile part 2 to another mobile part, which is not shown. However, this has the disadvantages that the circuit complexity in the base unit 1 is high, and that it is dependent on a physical connecting line 5 from which the standby power supply is derived.

Figure 2 shows a simplified block diagram of a further telecommunications terminal with a standby power supply according to the prior art. The same reference symbols denote the same or similar components which, therefore, will not be described in detail in the following text.

In contrast to Figure 1, the conventional tele-communications terminal shown in Figure 2 has a rechargeable energy store or a battery as the standby power supply

unit. This provides the necessary standby power supply for the base unit 1 during standby operation. The circuitry complexity in the base unit 1 is thus greatly reduced and, furthermore, there is no dependency on any physical communications interface (as in Figure 1). This is particularly important when the communications link 5 is in the form of a radio link or link via optical waveguides to the communications network KN, when it is not possible to transmit sufficient power from the communications network KN. However, the standby power supply shown in Figure 2 has the disadvantage that it uses an additional rechargeable energy store or battery block, since this increases the costs of the base unit 1 and enlarges its dimensions.

EP 0935377 A2, WO 99/31860 and GB 2279827 each disclose a standby power supply, in particular for telecommunications terminals, which includes a base unit for producing a link to a communications network, a power supply unit for supplying power to the base unit during mains operation, at least one mobile part with an associated mobile power supply unit for producing a link to the base unit, and a standby power supply unit for supplying standby power to the base unit during standby operation. The standby power supply is taken from the mobile power supply unit for the at least one mobile part via the standby power supply unit.

The present invention is directed toward a standby power supply and an associated method, in particular for a telecommunications terminal, wherein the standby power supply can be produced at low cost and occupies little space.

SUMMARY OF THE INVENTION

In particular, the use of a standby power supply unit which derives the standby power supply from a mobile power supply for a mobile part considerably reduces the costs and the dimensions of the base unit. Furthermore, such a standby power supply also can be used for telecommunications terminals in which it is impossible to supply standby power via a communications network. One part of the power supply unit represents a DC isolation unit for the standby power supply unit, thus making it possible to satisfy the stringent licensing requirements for exposed contacts (charging contacts) for a telecommunications terminal in a simple and low-cost manner. The standby power supply unit is, in this case, generally located in the mobile part, having an operating mode detection unit which detects each operating mode. This allows the

mobile part to reliably identify whether it is in a normal mode, a charging mode or a standby mode.

The standby power supply unit preferably has a DC/AC inverter in order to convert a DC voltage from the mobile power supply unit to an AC voltage for supplying standby power to the base unit. This allows the standby power supply to be passed through the DC-isolation unit. A control unit can, in this case, control the DC/AC inverter as a function of the detected operating mode, such that an optimum operating mode is ensured at all times.

The power supply unit preferably has a switching unit which allows it to be isolated from the electrical mains system during standby operation. This makes it possible to reliably prevent interference produced by the DC/AC inverter from being passed to the electrical mains system. Furthermore, this prevents power from flowing into other loads which still may be connected to the power supply line.

The mobile part is preferably a cordless telephone with a hands-free device, which is placed in a charging shell on the base unit during standby operation. In this case, the base unit with the mobile part placed on it acts like a conventional telephone with a hands-free device, but with the base unit being supplied with power from the mobile part and with cordless communication occurring from the mobile part to the base unit, and from the base unit to the communications network.

Additional features and advantages of the present invention are described in, and will be apparent from, the following Detailed Description of the Invention and the Figures.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows a simplified block diagram of a standby power supply for a telecommunications terminal according to the prior art.

Figure 2 shows a simplified block diagram of a further standby power supply for a telecommunications terminal according to the prior art.

Figure 3 shows a simplified block diagram of a standby power supply for a telecommunications terminal according to the present invention.

Figure 4 shows a block diagram of the major components of a power supply unit as shown in Figure 3.

DETAILED DESCRIPTION OF THE INVENTION

Figure 3 shows a simplified block diagram of a standby power supply for a telecommunications terminal according to the present invention, with the same reference symbols denoting the same or similar components as those in Figures 1 and 2, for which reason they will not be described in detail in the following text.

According to Figure 3, a telecommunications terminal includes a base unit 1 and at least one mobile part 2. As in the prior art shown in Figures 1 and 2, the base unit 1 is, in this case, connected via a power supply line 4 and a power supply unit 6 to an electrical mains system EN, with a communications link 5 being used to communicate with a communications network KN.

In Figure 3, the mobile part 2 is a cordless telephone, which is supplied from a mobile power supply unit EM. The mobile power supply unit EM normally has a rechargeable energy store, which can be charged via a charging interface 3 from a charging circuit, which is not shown, in the base unit 1. The charging interface 3 is normally in the form of a charging shell that is integral with the base unit 1.

In a normal operating mode, the standby power supply according to the present invention operates essentially in similar way to the prior art as shown in Figures 1 and 2. Therefore, this will not be described.

However, in a charging operating mode and, in particular, in a standby operating mode, the telecommunications terminal according to the present invention is significantly different to conventional terminals.

To be more precise, a standby power supply unit NSV, which is preferably located in the mobile part 2, supplies the base unit 1 when conventional mains operation (during which power is supplied via the electrical mains system EN) is impossible. As shown in Figure 3, the standby power supply for the base unit 1 is, in this case, derived by the standby power supply unit NSV from the mobile power supply unit EM (a rechargeable energy store), and is supplied to the base unit 1 via the charging interface 3.

In contrast to the conventional standby power supply shown in Figure 1, there is no need for any complex circuitry within the base unit in order to convert power provided from the communications network KN via the communications link 5 to a standby power supply. Furthermore, the standby power supply according to the

present invention also can provide standby power operation when the communications link 5 is a radio link (for example, a satellite link) or a link via glass fiber cable, in which case it is normally impossible to supply power from the communications network KN.

Furthermore, the present invention has the advantage over the conventional standby power supply shown in Figure 2 that no further rechargeable energy store or battery block need be used for the standby power supply unit in the base unit 1, thus making it possible to reduce not only the costs but also the dimensions of the base unit. Thus, according to the present invention, the mobile power supply unit EM, which is present in any case in the mobile part 2, is used as a standby power supply for the base unit 1. The standby power supply unit is preferably not physically located in the base unit 1, so that an already existing system can be provided with the standby power capability according to the present invention simply by purchasing mobile parts 2 or power supply units 6 with a standby power supply capability.

Figure 4 shows a detailed block diagram of one preferred exemplary embodiment of the major parts of a telecommunications terminal with a standby power supply. In Figure 4, the reference symbol 6 denotes the power supply unit for the base unit 1, which is preferably located in an external power supply device and, thus, can be easily replaced. The power supply unit 6 is connected via the power supply line 4 to the electrical mains system EN, which normally provides an AC voltage of 115 V or 230 V. The power supply unit 6 contains a primary coil L3 as well as a first and a second secondary coil L1 and L2, via which an AC voltage U_B is produced for the base unit 1, and an AC voltage U_{MT} is produced as a charging voltage for the at least one mobile part 2.

The first secondary voltage U_B produced by the power supply unit 6 is supplied to a rectifier circuit 8 in the base unit 1, thus producing a DC voltage VVC_B with respect to ground GND_B. The rectifier circuit 8 is preferably a diode circuit with 4 diodes D3, D4, D5 and D6, and a capacitor C1 for smoothing the ripple on the rectified voltage.

In contrast, the mobile part 2 has a standby power supply unit NSV, which operates in 3 different operating modes.

These are, firstly, the normal mode in which the mobile part is isolated from the charging interface 3 and the base unit is supplied with power from the power supply unit 6. In this case, the mobile part 2 is operated via the built-in mobile power supply unit EM, with a voltage which is dependent on the nature and number of rechargeable energy source cells that are used being produced at a connection VCC_{MT}. A connection GND_{MT} is, in this case, a reference point. The voltage supply VCC_{MT} and GND_{MT} obtained in this way is normally then raised by a converter circuit, which is not shown, to a higher stabilized voltage, thus producing the actual voltage or power supply for the mobile part. A measurement point MP of the standby power supply unit NSV, in this case, has a high impedance in the normal operating mode, since there is no link to the power supply unit 6 via the charging interface 3.

In a charging operating mode, the mobile part 2 is preferably located in the charging shell (not shown) of the base unit 1; that is to say, the mobile part 2 is connected to the charging interface 3. As shown in Figure 4, the charging interface 3 is connected to the second secondary coil L2 of the power supply unit 6, and thus receives an AC voltage when the mains supply is available. In consequence, in the charging operating mode, the mobile power supply unit EM is charged via a rectifier circuit and a current limiting circuit.

In the simplest case, this rectifier circuit includes a diode D1 (half-wave rectifier) and the current limiting circuit includes a series-connected resistor R1. The rectifier circuit D1 and the current limiting circuit R1 are connected, as shown in Figure 4, in a common current path in the mobile power supply unit EM. A positive half-cycle, which can be detected by a detection unit EE, is thus produced at the measurement point MP in the charging operating mode. A control unit SE evaluates the voltage signals detected by the detection unit EE, and drives a switching unit Q1 such that the switching unit Q1 always remains open in the charging operating mode. This allows the mobile power supply unit EM to be charged via the power supply unit 6.

In a standby operating mode, in which a mains system failure or some other defect results in no power being supplied from the electrical mains system EN, the first voltage U_B and the second voltage U_{MT} from the first and second secondary windings L1 and L2 are initially 0 V. In consequence, no communications link can be provided

via the base unit 1. Thus, in order to provide a standby power supply, a link is produced between the base unit 1 and the mobile part 2 via the charging interface 3 (for example, by placing the mobile part 2 in the charging shell), with a voltage of the same magnitude as the rechargeable energy store voltage being produced at the measurement point MP (the mobile power supply unit EM is short-circuited to the measurement MP via the second secondary coil L2 in the power supply unit 6). This change in voltage at the measurement point MP is detected by the detection unit EE and is passed on to the control unit SE. As shown in Figure 4, the detection unit EE includes a diode D2 and a capacitor C2 connected to ground. Furthermore, a resistor R2 can be optionally connected in parallel with the capacitor C2.

The detection circuit EE thus detects the voltage change (application of the rechargeable energy source voltage) at the measurement point MP, and signals this to the control unit SE. The control unit SE includes, for example, a microprocessor or a microcontroller, but also may be in the form of an analog or discrete control block.

In consequence, as shown in Figure 4, the voltage VCC_{MT} from the mobile power supply unit EM is supplied during standby power operation to the switching unit Q1, which can be driven by the control unit SE. The switching unit Q1, in this case, operates in conjunction with the second secondary winding L2 in the power supply unit as a flyback converter, with the switching frequency of the flyback converter being governed by the control unit SE. In consequence, the switching unit Q1 is switched on and off in an appropriate manner such that the voltage VCC_{MT} (+2.4V) produced at the measurement point MP is briefly grounded, so that corresponding induction currents and voltages are induced, via the second secondary coil L2, in the primary coil L3 and in the first secondary coil L1. In consequence, if the switching unit Q1 is driven in a suitable manner by the control unit SE, a voltage U_B' can be produced in the first secondary coil L1, corresponding to the normal induced voltage U_B, and this is rectified via the rectifier circuit 8 in the base unit 1 as the supply voltage. In consequence, there is no need for any changes whatsoever to be carried out in the base unit 1 in order to produce a standby power supply, since the entire circuit for the standby power supply is located in the mobile part 2. Furthermore, the standby power supply shown in Figure 4 complies with all the

requirements relating to the telecommunications licensing and safety standards, since high-quality DC isolation is used for the power supply unit 6.

The power supply unit 6 preferably may be in the form of an external power supply device, with an additional modification improving the effectiveness of standby operation. As shown in Figure 4, the power supply unit 6 in this case has a mains switching unit RE on the primary side, which allows disconnection or isolation from the electrical mains system EN during standby operation. This mains switching unit RE preferably includes a latching AC relay, which is switched on only when a supply voltage is present. When a mains failure or a defect occurs, the mains switching unit RE opens the contacts for the primary coil L3, so that this is completely decoupled from the electrical mains system EN and from any further load units, which are not shown. This ensures that the flyback converter frequency which is produced in the standby power supply unit NSV is not passed in the form of interference via the power supply unit 6 into the electrical mains system EN. In addition, it prevents any power from flowing to other load units (not shown) which still may be connected to the power supply line 4.

The present invention has been described above with reference to a base unit with a cordless telephone. However, it is not restricted to this and, in fact, covers all other mobile applications in which a mobile part is connected together with a mobile power supply unit to an associated base unit. Accordingly, so-called laptops, notebooks, palmtop units or other mobile applications operated from rechargeable energy sources and which are connected to a base unit via an interface that transmits power also can be used as mobile parts.

Furthermore, a large number of mobile parts may be connected to one base unit with, for example, one mobile part being used as a standby power supply unit and, hence, allowing communication with the other mobile parts via the base unit.

The mobile part is preferably a cordless telephone with a hands-free device, thus simplifying standby operation to an extraordinary extent. The communications network KN described above is preferably in the form of a bidirectional network, including public switching systems. However, it is not restricted to this and, in fact, includes all other communications networks (satellite systems, private switching systems, ...) via which telecommunication is possible.

Indeed, although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.

ABSTRACT OF THE DISCLOSURE

A standby power supply and an associated method, in particular in a telecommunications terminal, in which a standby power supply unit derives a standby power supply for a base unit from a rechargeable energy store in a mobile part, resulting in a standby power supply which is not only cost-effective but also space-saving.

In the Claims:

On page 13, cancel line 1 and substitute the following left-hand justified heading therefor:

CLAIMS

Please cancel claims 1-9, without prejudice, and substitute the following claims therefor:

10. A standby power supply for telecommunications terminals, comprising:

a base unit for producing a link to a communications network;

a power supply unit for supplying power to the base unit during mains operation;

at least one mobile part having an associated mobile power supply unit for producing a link to the base unit; and

a standby power supply unit for supplying standby power to the base unit during standby operation, wherein the standby power supply is drawn from the mobile power supply unit for the at least one mobile part by the standby power supply unit, and a part of the power supply unit serves as a DC-isolation unit for the standby power supply unit, and wherein the standby power supply unit includes an operating mode detection unit for detecting each operating mode, a DC/AC inverter unit for converting a DC voltage from the mobile power supply unit to an AC voltage for supplying the standby power to the base unit, and a control unit for controlling the DC/AC inverter unit as a function of the detected operating mode.

11. A standby power supply for telecommunications terminals as claimed in Claim 10, wherein the mobile power supply unit serves as a rechargeable energy store, and the base unit includes a charging interface for charging the mobile power supply unit during mains operation with the charging interface allowing the mobile power supply unit to discharge during standby operation.

12. A standby power supply for telecommunications terminals as claimed in Claim 10, wherein the power supply unit includes a mains switching unit which allows disconnection from an electrical mains system during standby operation.

13. A standby power supply for telecommunications terminals as claimed in Claim 12, wherein the mains switching unit is a latching relay.

14. A standby power supply for telecommunications terminals as claimed in Claim 10, wherein the standby power supply unit is in both the mobile part and the power supply unit.

15. A standby power supply for telecommunications terminals as claimed in Claim 10, wherein the mobile part is a cordless telephone with an integrated hands-free device.

16. A method for providing a standby power supply in a telecommunications terminal, the method comprising the steps of:

providing a base unit for producing a link to a communications network;

providing a power supply unit for supplying power to the base unit during mains operation;

providing at least one mobile part having an associated mobile power supply unit for producing a link to the base unit;

providing a standby power supply unit for supplying standby power to the base unit during standby operation, wherein the standby power supply is drawn from the mobile power supply unit for the at least one mobile part by the standby power supply unit;

DC-isolating the base unit from the mobile part;

detecting standby operation via an operating mode detection unit;

producing an AC voltage from a DC voltage in the mobile power supply unit; and

transferring the produced AC voltage as a standby power supply for the base unit.

17. A method for providing a standby power supply in a telecommunications terminal as claimed in Claim 16, wherein the base unit is electrically isolated from an electrical mains system during standby operation.

18. A method for providing a standby power supply in a telecommunications terminal as claimed in Claim 17, wherein the electrical isolation is produced in the power supply unit.

REMARKS

The present amendment makes editorial changes and corrects typographical errors in the specification, which includes the Abstract, in order to conform the specification to the requirements of United States Patent Practice. No new matter is added thereby. Attached hereto is a marked-up version of the changes made to the specification by the present amendment. The attached page is captioned "**Version With Markings To Show Changes Made**".

In addition, the present amendment cancels original claims 1-9 in favor of new claims 10-18. Claims 10-18 have been presented solely because the revisions by red-lining and underlining which would have been necessary in claims 1-9 in order to present those claims in accordance with preferred United States Patent Practice would have been too extensive, and thus would have been too burdensome. The present amendment is intended for clarification purposes only and not for substantial reasons related to patentability pursuant to 35 U.S.C. §§101, 102, 103 or 112. Indeed, the cancellation of claims 1-9 does not constitute an intent on the part of the Applicants to surrender any of the subject matter of claims 1-9.

Early consideration on the merits is respectfully requested.

Respectfully submitted,

(Reg. No. 39,056)

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Attorneys for Applicants

Version With Markings To Show Changes Made

~~Description~~ S P E C I F I C A T I O N

~~Standby power supply and an associated method~~

TITLE OF THE INVENTION

STANDBY POWER SUPPLY AND ASSOCIATED METHOD

BACKGROUND OF THE INVENTION

The present invention relates to a standby power supply and to an associated method and, in particular, to a standby power supply in a telecommunications terminal ~~comprising~~ having a base station and at least one cordless mobile part.

Telecommunications terminals in the form of cordless mobile applications are becoming increasingly important since they allow greater flexibility for the user, with reduced installation complexity. Normally, such telecommunications terminals ~~comprise~~ include a base station which draws its power supply from an electrical mains system and is connected via a communications link (for example, a telephone line) to a communications network. An associated mobile part is preferably cordless, and is connected to the base unit via, for example, a standardized radio interface (for example, DECT).

During normal operation, such a conventional base unit is supplied with power from the electrical mains system, while the mobile part draws its power supply from a mobile power supply, such as a rechargeable energy store. While it is being charged, the mobile part is normally held in the base unit, and is charged via the electrical mains system. However, telecommunications terminals such as these have a disadvantage when it is impossible to supply power from the electrical mains system owing to defects or a power failure. In a case such as this, the base unit cannot set up a link either to the mobile part (or to a large number of mobile parts) or the communications network, so that the communications link is interrupted, or fails.

Thus, in order to maintain a communications link in an emergency as well, the base unit normally has a so-called standby power supply, which ensures that at least the essential functions can be operated.

Figure 1 shows a simplified block diagram of a telecommunications terminal with a standby power supply according to the prior art, as is known, for example, from the document US 5,495,530. The reference symbol 1 in Figure 1 denotes a base unit~~,~~

which is connected to a mobile part 2 via a radio link. The base unit 1 and the mobile part 2 have a respective antenna AB and AM for this purpose, with an associated transmitting/receiving apparatus (which is not shown). The mobile part 2 has a mobile power supply unit EM for supplying power~~, and this~~. This is normally in the form of a rechargeable energy store. In order to charge this mobile power supply unit EM, the mobile part 2 can be connected to a charging interface 3 with an associated charging circuit (which is not shown).

A power supply unit 6, which is connected to an electrical mains system EN via a power supply line 4, is used to supply power to the base unit 1. The electrical mains system EN provides an AC voltage~~,~~ normally of 115 V or 230 V. The power supply unit 6 converts this voltage to a DC voltage, which is used as the supply voltage for the base unit 1. In this case, the power supply unit 6 may be integrated in the base unit 1, or may be connected as an external power supply unit. A communications link 5 which ~~comprises~~ includes, for example, a/b conductors, is provided for connecting the base unit 1 to a communications network KN. If the power supply line 4 is interrupted, or if the electrical mains system EN fails, a standby power supply for the base unit 1 is, according to Figure 1, derived from the communications link 5 via a standby power supply unit NSV (standby operation).

A standby power supply such as this makes use of the fact that a certain power supply capability is available, as a standby power supply, on the communications link 5 from the communications network KN. In this way, during standby operation, the base unit 1 can be supplied with power, as shown in Figure 1, such that a communications link can be set up from the mobile part 2 to the communications network KN, or from the mobile part 2 to another mobile part, which is not shown. However, this has the disadvantages that the circuit complexity in the base unit 1 is high, and that it is dependent on a physical connecting line 5~~,~~ from which the standby power supply is derived.

Figure 2 shows a simplified block diagram of a further telecommunications terminal with a standby power supply according to the prior art. The same reference symbols denote the same or similar components~~,~~ which ~~will~~, therefore, will not be described in detail in the following text.

In contrast to Figure 1, the conventional tele-communications terminal shown in Figure 2 has a rechargeable energy store or a battery as the standby power supply unit~~, and this~~. This provides the necessary standby power supply for the base unit 1 during standby operation. The circuitry complexity in the base unit 1 is thus greatly reduced~~,~~ and, furthermore, there is no dependency on any physical communications interface (as in Figure 1). This is particularly important when the communications link 5 is in the form of a radio link or link via optical waveguides to the communications network KN, when it is not possible to transmit sufficient power from the communications network KN. However, the standby power supply shown in Figure 2 has the disadvantage that it uses an additional rechargeable energy store or battery block, since this increases the costs of the base unit 1~~,~~ and enlarges its dimensions.

EP 0935377 A2, WO 99/31860 and GB 2279827 each disclose a standby power supply, in particular for telecommunications terminals, which ~~comprises~~ includes a base unit for producing a link to a communications network, a power supply unit for supplying power to the base unit during mains operation, at least one mobile part with an associated mobile power supply unit for producing a link to the base unit, and a standby power supply unit for supplying standby power to the base unit during standby operation~~, with the~~. The standby power supply ~~being~~ is taken from the mobile power supply unit for the at least one mobile part ~~by means of~~ via the standby power supply unit.

The present invention is ~~based on the object of providing~~ directed toward a standby power supply and an associated method, in particular for a telecommunications terminal, ~~which~~ wherein the standby power supply can be produced at low cost and occupies little space.

~~According to the invention, this object is achieved with regard to the standby power supply by the features of patent claim 1, and with regard to the method by the measures in patent claim 7.~~

SUMMARY OF THE INVENTION

In particular, the use of a standby power supply unit which derives the standby power supply from a mobile power supply for a mobile part considerably reduces the costs and the dimensions of the base unit. Furthermore, such a standby power supply

~~can~~ also can be used for telecommunications terminals in which it is impossible to supply standby power via a communications network. One part of the power supply unit represents a DC isolation unit for the standby power supply unit, thus making it possible to satisfy the stringent licensing requirements for exposed contacts (charging contacts) for a telecommunications terminal in a simple and low-cost manner. The standby power supply unit is, in this case, generally located in the mobile part, having an operating mode detection unit which detects each operating mode. This allows the mobile part to reliably identify whether it is in a normal mode, a charging mode or a standby mode.

The standby power supply unit preferably has a DC/AC inverter in order to convert a DC voltage from the mobile power supply unit to an AC voltage for supplying standby power to the base unit. This allows the standby power supply to be passed through the DC-isolation unit. A control unit can, in this case, control the DC/AC inverter as a function of the detected operating mode, such that an optimum operating mode is ensured at all times.

The power supply unit preferably has a switching unit which allows it to be isolated from the electrical mains system during standby operation. This makes it possible to reliably prevent interference produced by the DC/AC inverter from being passed to the electrical mains system. Furthermore, this prevents power from flowing into other loads which ~~may~~ still may be connected to the power supply line.

The mobile part is preferably a cordless telephone with a hands-free device, which is placed in a charging shell on the base unit during standby operation. In this case, the base unit with the mobile part placed on it acts like a conventional telephone with a hands-free device, but with the base unit being supplied with power from the mobile part and with cordless communication occurring from the mobile part to the base unit, and ~~then~~ from ~~there~~ the base unit to the communications network.

~~Further advantageous refinements of the invention are characterized in the other patent claims.~~ Additional features and advantages of the present invention are described in, and will be apparent from, the following Detailed Description of the Invention and the Figures.

~~The invention will be described in more detail in the following text using an exemplary embodiment and with reference to the drawing, in which:~~

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows a simplified block diagram of a standby power supply for a telecommunications terminal according to the prior art~~;~~.

Figure 2 shows a simplified block diagram of a further standby power supply for a telecommunications terminal according to the prior art~~;~~.

Figure 3 shows a simplified block diagram of a standby power supply for a telecommunications terminal according to the present invention~~; and~~.

Figure 4 shows a block diagram of the major components of a power supply unit as shown in Figure 3.

DETAILED DESCRIPTION OF THE INVENTION

Figure 3 shows a simplified block diagram of a standby power supply for a telecommunications terminal according to the present invention, with the same reference symbols denoting the same or similar components as those in Figures 1 and 2, for which reason they will not be described in detail in the following text.

According to Figure 3, a telecommunications terminal ~~comprises~~ includes a base unit 1 and at least one mobile part 2. As in the prior art shown in Figures 1 and 2, the base unit 1 is, in this case, connected via a power supply line 4 and a power supply unit 6 to an electrical mains system EN, with a communications link 5 being used to communicate with a communications network KN.

In Figure 3, the mobile part 2 is a cordless telephone, which is supplied from a mobile power supply unit EM. The mobile power supply unit EM normally has a rechargeable energy store, which can be charged via a charging interface 3 from a charging circuit, which is not shown, in the base unit 1. The charging interface 3 is normally in the form of a charging shell that is integral with the base unit 1.

In a normal operating mode, the standby power supply according to the present invention operates essentially in similar way to the prior art as shown in Figures 1 and 2~~, and~~. Therefore, this will ~~therefore~~ not be described.

However, in a charging operating mode and, in particular, in a standby operating mode, the telecommunications terminal according to the present invention is significantly different to conventional terminals.

To be more precise, a standby power supply unit NSV, which is preferably located in the mobile part 2, supplies the base unit 1 when conventional mains

operation (during which power is supplied via the electrical mains system EN) is impossible. As shown in Figure 3, the standby power supply for the base unit 1 is, in this case, derived by the standby power supply unit NSV from the mobile power supply unit EM (a rechargeable energy store), and is supplied to the base unit 1 via the charging interface 3.

In contrast to the conventional standby power supply shown in Figure 1, there is ~~thus~~ no need for any complex circuitry within the base unit in order to convert power provided from the communications network KN via the communications link 5 to a standby power supply. Furthermore, the standby power supply according to the present invention ~~can~~ also can provide standby power operation when the communications link 5 is a radio link (for example, a satellite link) or a link via glass fiber cable, in which case it is normally impossible to supply power from the communications network KN.

Furthermore, the present invention has the advantage over the conventional standby power supply shown in Figure 2 that no further rechargeable energy store or battery block need be used for the standby power supply unit in the base unit 1, thus making it possible to reduce not only the costs but also the dimensions of the base unit. Thus, according to the present invention, the mobile power supply unit EM, which is present in any case in the mobile part 2, is used as a standby power supply for the base unit 1. The standby power supply unit is preferably not physically located in the base unit 1, so that an already existing system can be provided with the standby power capability according to the present invention simply by purchasing mobile parts 2 or power supply units 6 with a standby power supply capability.

Figure 4 shows a detailed block diagram of one preferred exemplary embodiment of the major parts of a telecommunications terminal with a standby power supply. In Figure 4, the reference symbol 6 denotes the power supply unit for the base unit 1, which is preferably located in an external power supply device, and, thus, can be easily ~~be~~ replaced. The power supply unit 6 is connected via the power supply line 4 to the electrical mains system EN, which normally provides an AC voltage of 115 V or 230 V. The power supply unit 6 contains a primary coil L3 as well as a first and a second secondary coil L1 and L2, via which an AC voltage U_B is produced for the

base unit 1, and an AC voltage U_{MT} is produced as a charging voltage for the at least one mobile part 2.

The first secondary voltage U_B produced by the power supply unit 6 is supplied to a rectifier circuit 8 in the base unit 1, thus producing a DC voltage VVC_B with respect to ground GND_B. The rectifier circuit 8 is preferably a diode circuit with 4 diodes D3, D4, D5 and D6, and a capacitor C1 for smoothing the ripple on the rectified voltage.

In contrast, the mobile part 2 has a standby power supply unit NSV, which operates in 3 different operating modes.

These are, firstly, the normal mode in which the mobile part is isolated from the charging interface 3 and the base unit is supplied with power from the power supply unit 6. In this case, the mobile part 2 is operated via the built-in mobile power supply unit EM, with a voltage which is dependent on the nature and number of rechargeable energy source cells that are used being produced at a connection VCC_{MT}. A connection GND_{MT} is, in this case, a reference point. The voltage supply VCC_{MT} and GND_{MT} obtained in this way is normally then raised by a converter circuit, which is not shown, to a higher stabilized voltage, thus producing the actual voltage or power supply for the mobile part. A measurement point MP of the standby power supply unit NSV, in this case, has a high impedance in the normal operating mode, since there is no link to the power supply unit 6 via the charging interface 3.

In a charging operating mode, the mobile part 2 is preferably located in the charging shell (not shown) of the base unit 1, that is to say, the mobile part 2 is connected to the charging interface 3. As shown in Figure 4, the charging interface 3 is connected to the second secondary coil L2 of the power supply unit 6, and thus receives an AC voltage when the mains supply is available. In consequence, in the charging operating mode, the mobile power supply unit EM is charged via a rectifier circuit and a current limiting circuit.

In the simplest case, this rectifier circuit ~~comprises~~ includes a diode D1 (half-wave rectifier) and the current limiting circuit ~~comprises~~ includes a series-connected resistor R1. The rectifier circuit D1 and the current limiting circuit R1 are connected, as shown in Figure 4, in a common current path in the mobile power supply unit EM. A positive half-cycle, which can be detected by a detection unit EE, is thus produced

at the measurement point MP in the charging operating mode. A control unit SE evaluates the voltage signals detected by the detection unit EE, and drives a switching unit Q1 such that the switching unit Q1 always remains open in the charging operating mode. This allows the mobile power supply unit EM to be charged via the power supply unit 6.

In a standby operating mode, in which a mains system failure or some other defect ~~means that~~ results in no power ~~is~~ being supplied from the electrical mains system EN, the first voltage U_B and the second voltage U_{MT} from the first and second secondary windings L1 and L2 are initially 0 V. In consequence, no communications link can be provided via the base unit 1. Thus, in order to provide a standby power supply, a link is produced between the base unit 1 and the mobile part 2 via the charging interface 3 (for example, by ~~part~~ placing the mobile part 2 in the charging shell), with a voltage of the same magnitude as the rechargeable energy store voltage being produced at the measurement point MP (the mobile power supply unit EM is short-circuited to the measurement MP via the second secondary coil L2 in the power supply unit 6). This change in voltage at the measurement point MP is detected by the detection unit EE and is passed on to the control unit SE. As shown in Figure 4, the detection unit EE ~~comprises~~ includes a diode D2 and a capacitor C2 connected to ground. Furthermore, a resistor R2 can be optionally ~~be~~ connected in parallel with the capacitor C2.

The detection circuit EE thus detects the voltage change (application of the rechargeable energy source voltage) at the measurement point MP, and signals this to the control unit SE. The control unit SE ~~comprises~~ includes, for example, a microprocessor or a microcontroller, but ~~may~~ also may be in the form of an analog or discrete control block.

In consequence, as shown in Figure 4, the voltage VCC_{MT} from the mobile power supply unit EM is supplied during standby power operation to the switching unit Q1, which can be driven by the control unit SE. The switching unit Q1, in this case, operates in conjunction with the second secondary winding L2 in the power supply unit as a flyback converter, with the switching frequency of the flyback converter being governed by the control unit SE. In consequence, the switching unit Q1 is ~~swiched~~ switched on and off in an appropriate manner such that the voltage

VCC_{MT} (+2.4V) produced at the measurement point MP is briefly grounded, so that corresponding induction currents and voltages are induced, via the second secondary coil L2, in the primary coil L3 and in the first secondary coil L1. In consequence, if the switching unit Q1 is driven in a suitable manner by the control unit SE, a voltage U_B' can be produced in the first secondary coil L1, corresponding to the normal induced voltage U_B, and this is ~~thus~~ rectified via the rectifier circuit 8 in the base unit 1 as the supply voltage. In consequence, there is no need for any changes whatsoever to be carried out in the base unit 1 in order to produce a standby power supply, since the entire circuit for the standby power supply is located in the mobile part 2. Furthermore, the standby power supply shown in Figure 4 complies with all the requirements relating to the telecommunications licensing and safety standards, since high-quality DC isolation is used for the power supply unit 6.

The power supply unit 6 ~~may~~ preferably may be in the form of an external power supply device, with an additional modification improving the effectiveness of standby operation. As shown in Figure 4, the power supply unit 6 in this case has a mains switching unit RE on the primary side, which allows disconnection or isolation from the electrical mains system EN during standby operation. This mains switching unit RE preferably ~~comprises~~ includes a latching AC relay, which is switched on only when a supply voltage is present. When a mains failure or a defect occurs, the mains switching unit RE opens the contacts for the primary coil L3, so that this is completely decoupled from the electrical mains system EN and from any further load units, which are not shown. This ensures that the flyback converter frequency which is produced in the standby power supply unit NSV is not passed in the form of interference via the power supply unit 6 into the electrical mains system EN. In addition, it prevents any power from flowing to other load units (not shown) which ~~may~~ still may be connected to the power supply line 4.

The present invention has been described above with reference to a base unit with a cordless telephone. However, it is not restricted to this and, in fact, covers all other mobile applications in which a mobile part is connected together with a mobile power supply unit to an associated base unit. Accordingly, so-called laptops, notebooks, palmtop units or other mobile applications operated from rechargeable

energy sources and which are connected to a base unit via an interface that transmits power ~~can~~ also can be used as mobile parts.

Furthermore, a large number of mobile parts may be connected to one base unit with, for example, one mobile part being used as a standby power supply unit~~,~~ and, hence, allowing communication with the other mobile parts via the base unit.

The mobile part is preferably a cordless telephone with a hands-free device, thus simplifying standby operation to an extraordinary extent. The communications network KN described above is preferably in the form of a bidirectional network, ~~comprising~~ including public switching systems. However, it is not restricted to this and, in fact, includes all other communications networks (satellite systems, private switching systems, ...) via which telecommunication is possible.

Indeed, although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.

~~Abstract~~

~~Standby power supply and an associated method~~

ABSTRACT OF THE DISCLOSURE

~~The invention relates to a~~ A standby power supply and an associated method, in particular in a telecommunications terminal, in which a standby power supply unit ~~(NSV)~~ derives a standby power supply for a base unit ~~(1)~~ from a rechargeable energy store ~~(EM)~~ in a mobile part~~(2). This results~~, resulting in a standby power supply~~,~~ which is not only cost-effective but also ~~saves space, in a telecommunications terminal~~ space-saving.

~~Figure 3~~

Description

Standby power supply and an associated method

The present invention relates to a standby power supply and to an associated method and, in particular, to a standby power supply in a telecommunications terminal comprising a base station and at least one cordless mobile part.

Telecommunications terminals in the form of cordless mobile applications are becoming increasingly important since they allow greater flexibility for the user, with reduced installation complexity. Normally, such telecommunications terminals comprise a base station which draws its power supply from an electrical mains system and is connected via a communications link (for example a telephone line) to a communications network. An associated mobile part is preferably cordless, and is connected to the base unit via, for example, a standardized radio interface (for example, DECT).

During normal operation, such a conventional base unit is supplied with power from the electrical mains system, while the mobile part draws its power supply from a mobile power supply, such as a rechargeable energy store. While it is being charged, the mobile part is normally held in the base unit, and is charged via the electrical mains system. However, telecommunications terminals such as these have a disadvantage when it is impossible to supply power from the electrical mains system owing to defects or a power failure. In a case such as this, the base unit cannot set up a link either to the mobile part (or to a large number of mobile parts) or the communications network, so that the communications link is interrupted, or fails.

Thus, in order to maintain a communications link in an emergency as well, the base unit normally has a so-called standby power supply, which ensures that at least the essential functions can be operated.

Figure 1 shows a simplified block diagram of a telecommunications terminal with a standby power supply according to the prior art, as is known, for example, from the document US 5,495,530. The reference symbol 1 in Figure 1 denotes a base unit, which is connected to a mobile part 2 via a radio link. The base unit 1 and the mobile part 2 have a respective antenna AB and AM for this purpose, with an associated transmitting/receiving apparatus (which is not shown). The mobile part 2 has a mobile power supply unit EM for supplying power, and this is normally in the form of a rechargeable energy store. In order to charge this mobile power supply unit EM, the mobile part 2 can be connected to a charging interface 3 with an associated charging circuit (which is not shown).

A power supply unit 6, which is connected to an electrical mains system EN via a power supply line 4 is used to supply power to the base unit 1. The electrical mains system EN provides an AC voltage, normally of 115 V or 230 V. The power supply unit 6 converts this voltage to a DC voltage, which is used as the supply voltage for the base unit 1. In this case, the power supply unit 6 may be integrated in the base unit 1, or may be connected as an external power supply unit. A communications link 5 which comprises, for example, a/b conductors is provided for connecting the base unit 1 to a communications network KN. If the power supply line 4 is interrupted, or the electrical mains system EN fails, a standby power supply for the base unit 1 is, according to Figure 1, derived from the communications link 5 via a standby power supply unit NSV (standby operation).

A standby power supply such as this makes use of the fact that a certain power supply capability is available, as a standby power supply, on the communications link 5 from the communications network KN. In this way, during standby operation, the base unit 1 can be supplied with power, as shown in Figure 1, such that a communications link can be set up from the mobile part 2 to the communications network KN, or from the mobile part 2 to another mobile part, which is not shown. However, this has the disadvantages that the circuit complexity in the base unit 1 is high and that it is dependent on a physical connecting line 5, from which the standby power supply is derived.

Figure 2 shows a simplified block diagram of a further telecommunications terminal with a standby power supply according to the prior art. The same reference symbols denote the same or similar components, which will therefore not be described in detail in the following text.

In contrast to Figure 1, the conventional telecommunications terminal shown in Figure 2 has a rechargeable energy store or a battery as the standby power supply unit, and this provides the necessary standby power supply for the base unit 1 during standby operation. The circuitry complexity in the base unit 1 is thus greatly reduced, and, furthermore, there is no dependency on any physical communications interface (as in Figure 1). This is particularly important when the communications link 5 is in the form of a radio link or link via optical waveguides to the communications network KN, when it is not possible to transmit sufficient power from the communications network KN. However, the standby power supply shown in Figure 2 has the disadvantage that it uses an additional rechargeable energy store or battery block,

since this increases the costs of the base unit 1, and enlarges its dimensions.

EP 0935377 A2, WO 99/31860 and GB 2279827 each disclose a standby power supply, in particular for telecommunications terminals, which comprises a base unit for producing a link to a communications network, a power supply unit for supplying power to the base unit during mains operation, at least one mobile part with an associated mobile power supply unit for producing a link to the base unit, and a standby power supply unit for supplying standby power to the base unit during standby operation, with the standby power supply being taken from the mobile power supply unit for the at least one mobile part by means of the standby power supply unit.

The invention is based on the object of providing a standby power supply and an associated method in particular for a telecommunications terminal, which standby power supply can be produced at low cost and occupies little space.

According to the invention, this object is achieved with regard to the standby power supply by the features of patent claim 1, and with regard to the method by the measures in patent claim 7.

In particular, the use of a standby power supply unit which derives the standby power supply from a mobile power supply for a mobile part considerably reduces the costs and the dimensions of the base unit. Furthermore, such a standby power supply can also be used for telecommunications terminals in which it is impossible to supply standby power via a communications network. One part of the power supply unit represents a DC isolation unit for the standby power supply unit, thus making it possible to satisfy the stringent licensing

requirements for exposed contacts (charging contacts) for a telecommunications terminal in a simple and low-cost manner. The standby power supply unit is in this case generally located in the mobile part, having an

operating mode detection unit which detects each operating mode. This allows the mobile part to reliably identify whether it is in a normal mode, a charging mode or a standby mode.

The standby power supply unit preferably has a DC/AC inverter in order to convert a DC voltage from the mobile power supply unit to an AC voltage for supplying standby power to the base unit. This allows the standby power supply to be passed through the DC-isolation unit. A control unit can in this case control the DC/AC inverter as a function of the detected operating mode, such that an optimum operating mode is ensured at all times.

The power supply unit preferably has a switching unit which allows it to be isolated from the electrical mains system during standby operation. This makes it possible to reliably prevent interference produced by the DC/AC inverter from being passed to the electrical mains system. Furthermore, this prevents power from flowing into other loads which may still be connected to the power supply line.

The mobile part is preferably a cordless telephone with a hands-free device, which is placed in a charging shell on the base unit during standby operation. In this case, the base unit with the mobile part placed on it acts like a conventional telephone with a hands-free device, but with the base unit being supplied with power from the mobile part and with cordless communication from the mobile part to the base unit, and then from there to the communications network.

Further advantageous refinements of the invention are

characterized in the other patent claims.

The invention will be described in more detail in the following text using an exemplary embodiment and with reference to the drawing, in which:

Figure 1 shows a simplified block diagram of a standby power supply for a telecommunications terminal according to the prior art;

Figure 2 shows a simplified block diagram of a further standby power supply for a telecommunications terminal according to the prior art;

Figure 3 shows a simplified block diagram of a standby power supply for a telecommunications terminal according to the present invention; and

Figure 4 shows a block diagram of the major components of a power supply unit as shown in Figure 3.

Figure 3 shows a simplified block diagram of a standby power supply for a telecommunications terminal according to the present invention, with the same reference symbols denoting the same or similar components as those in Figures 1 and 2, for which reason they will not be described in detail in the following text.

According to Figure 3, a telecommunications terminal comprises a base unit 1 and at least one mobile part 2. As in the prior art shown in Figures 1 and 2, the base unit 1 is in this case connected via a power supply line 4 and a power supply unit 6 to an electrical mains system EN, with a communications link 5 being used to communicate with a communications network KN.

In Figure 3, the mobile part 2 is a cordless telephone, which is supplied from a mobile power supply unit EM. The mobile power supply unit EM normally has a rechargeable energy store, which can be charged via a charging interface 3 from a charging circuit, which is not shown, in the base unit 1. The charging interface 3 is normally in the form of a charging shell that is integral with the base unit 1.

In a normal operating mode, the standby power supply according to the invention operates essentially in a

similar way to the

prior art as shown in Figures 1 and 2, and this will therefore not be described.

However, in a charging operating mode and, in particular, in a standby operating mode, the telecommunications terminal according to the invention is significantly different to conventional terminals.

To be more precise, a standby power supply unit NSV, which is preferably located in the mobile part 2, supplies the base unit 1 when conventional mains operation (during which power is supplied via the electrical mains system EN) is impossible. As shown in Figure 3, the standby power supply for the base unit 1 is in this case derived by the standby power supply unit NSV from the mobile power supply unit EM (a rechargeable energy store), and is supplied to the base unit 1 via the charging interface 3.

In contrast to the conventional standby power supply shown in Figure 1, there is thus no need for any complex circuitry within the base unit in order to convert power provided from the communications network KN via the communications link 5 to a standby power supply. Furthermore, the standby power supply according to the invention can also provide standby power operation when the communications link 5 is a radio link (for example a satellite link) or a link via glass fiber cable, in which case it is normally impossible to supply power from the communications network KN.

Furthermore, the present invention has the advantage over the conventional standby power supply shown in Figure 2 that no further rechargeable energy store or battery block need be used for the standby power supply unit in the base unit 1, thus making it possible to reduce not only the costs but also the dimensions of the base unit. Thus, according to the invention, the

mobile power supply unit EM, which is present in any case in the

mobile part 2, is used as a standby power supply for the base unit 1. The standby power supply unit is preferably not physically located in the base unit 1, so that an already existing system can be provided with the standby power capability according to the invention simply by purchasing mobile parts 2 or power supply units 6 with a standby power supply capability.

Figure 4 shows a detailed block diagram of one preferred exemplary embodiment of the major parts of a telecommunications terminal with a standby power supply. In Figure 4, the reference symbol 6 denotes the power supply unit for the base unit 1, which is preferably located in an external power supply device, and thus can easily be replaced. The power supply unit 6 is connected via the power supply line 4 to the electrical mains system EN, which normally provides an AC voltage of 115 V or 230 V. The power supply unit 6 contains a primary coil L3 as well as a first and a second secondary coil L1 and L2, via which an AC voltage U_B is produced for the base unit 1, and an AC voltage U_{MT} is produced as a charging voltage for the at least one mobile part 2.

The first secondary voltage U_B produced by the power supply unit 6 is supplied to a rectifier circuit 8 in the base unit 1, thus producing a DC voltage VVC_B with respect to ground GND_B. The rectifier circuit 8 is preferably a diode circuit with 4 diodes D3, D4, D5 and D6, and a capacitor C1 for smoothing the ripple on the rectified voltage.

In contrast, the mobile part 2 has a standby power supply unit NSV, which operates in 3 different operating modes.

These are, firstly, the normal mode in which the mobile part is isolated from the charging interface 3 and the

base unit is supplied with power from the power supply unit 6. In this case,

the mobile part 2 is operated via the built-in mobile power supply unit EM, with a voltage which is dependent on the nature and number of rechargeable energy source cells that are used being produced at a connection VCC_{MT}. A connection GND_{MT} is in this case a reference point. The voltage supply VCC_{MT} and GND_{MT} obtained in this way is normally then raised by a converter circuit, which is not shown, to a higher stabilized voltage, thus producing the actual voltage or power supply for the mobile part. A measurement point MP of the standby power supply unit NSV in this case has a high impedance in the normal operating mode, since there is no link to the power supply unit 6 via the charging interface 3.

In a charging operating mode, the mobile part 2 is preferably located in the charging shell (not shown) of the base unit 1, that is to say the mobile part 2 is connected to the charging interface 3. As shown in Figure 4, the charging interface 3 is connected to the second secondary coil L2 of the power supply unit 6, and thus receives an AC voltage when the mains supply is available. In consequence, in the charging operating mode, the mobile power supply unit EM is charged via a rectifier circuit and a current limiting circuit.

In the simplest case, this rectifier circuit comprises a diode D1 (half-wave rectifier) and the current limiting circuit comprises a series-connected resistor R1. The rectifier circuit D1 and the current limiting circuit R1 are connected, as shown in Figure 4, in a common current path in the mobile power supply unit EM. A positive half-cycle, which can be detected by a detection unit EE, is thus produced at the measurement point MP in the charging operating mode. A control unit SE evaluates the voltage signals detected by the detection unit EE, and drives a switching unit Q1 such that the switching unit Q1 always remains open in the

charging operating mode. This allows the mobile power supply unit EM to be charged via the power supply unit 6.

In a standby operating mode, in which a mains system failure or some other defect means that no power is being supplied from the electrical mains system EN, the first voltage U_B and the second voltage U_{MT} from the first and second secondary windings L1 and L2 are initially 0 V. In consequence, no communications link can be provided via the base unit 1. Thus, in order to provide a standby power supply, a link is produced between the base unit 1 and the mobile part 2 via the charging interface 3 (for example by part placing the mobile part 2 in the charging shell), with a voltage of the same magnitude as the rechargeable energy store voltage being produced at the measurement point MP (the mobile power supply unit EM is short-circuited to the measurement MP via the second secondary coil L2 in the power supply unit 6). This change in voltage at the measurement point MP is detected by the detection unit EE and is passed on to the control unit SE. As shown in Figure 4, the detection unit EE comprises a diode D2 and a capacitor C2 connected to ground. Furthermore, a resistor R2 can optionally be connected in parallel with the capacitor C2.

The detection circuit EE thus detects the voltage change (application of the rechargeable energy source voltage) at the measurement point MP, and signals this to the control unit SE. The control unit SE comprises, for example, a microprocessor or a microcontroller, but may also be in the form of an analog or discrete control block.

In consequence, as shown in Figure 4, the voltage VCC_{MT} from the mobile power supply unit EM is supplied during standby power operation to the switching unit Q1, which can be driven by the control unit SE. The switching unit Q1 in this case operates in conjunction with the second secondary winding L2 in the power supply unit as a flyback converter, with the switching frequency of

the flyback converter being governed by the control unit SE. In consequence, the switching unit Q1 is swiched on and off in an appropriate manner such that the voltage VCC_{MT} (+2.4V) produced at the measurement point MP is briefly grounded, so that corresponding induction currents and voltages are induced,

via the second secondary coil L2, in the primary coil L3 and in the first secondary coil L1. In consequence, if the switching unit Q1 is driven in a suitable manner by the control unit SE, a voltage U_B' can be produced in the first secondary coil L1, corresponding to the normal induced voltage U_B and this is thus rectified via the rectifier circuit 8 in the base unit 1 as the supply voltage. In consequence, there is no need for any changes whatsoever to be carried out in the base unit 1 in order to produce a standby power supply, since the entire circuit for the standby power supply is located in the mobile part 2. Furthermore, the standby power supply shown in Figure 4 complies with all the requirements relating to the telecommunications licensing and safety standards, since high-quality DC isolation is used for the power supply unit 6.

The power supply unit 6 may preferably be in the form of an external power supply device, with an additional modification improving the effectiveness of standby operation. As shown in Figure 4, the power supply unit 6 in this case has a mains switching unit RE on the primary side, which allows disconnection or isolation from the electrical mains system EN during standby operation. This mains switching unit RE preferably comprises a latching AC relay, which is switched on only when a supply voltage is present. When a mains failure or a defect occurs, the mains switching unit RE opens the contacts for the primary coil L3, so that this is completely decoupled from the electrical mains system EN and from any further load units, which are not shown. This ensures that the flyback converter frequency which is produced in the standby power supply unit NSV is not passed in the form of interference via the power supply unit 6 into the electrical mains system EN. In addition, it prevents any power from flowing to other load units (not shown) which may still be connected to the power supply line 4.

The invention has been described above with reference to a base unit with a cordless telephone. However, it is not restricted to this and, in fact, covers all other mobile applications in which a mobile part is connected together with a mobile power supply unit to an associated base unit. Accordingly, so-called laptops, notebooks, palmtop units or other mobile applications operated from rechargeable energy sources and which are connected to a base unit via an interface that transmits power can also be used as mobile parts.

Furthermore, a large number of mobile parts may be connected to one base unit with, for example, one mobile part being used as a standby power supply unit, and hence allowing communication with the other mobile parts via the base unit.

The mobile part is preferably a cordless telephone with a hands-free device, thus simplifying standby operation to an extraordinary extent. The communications network KN described above is preferably in the form of a bidirectional network, comprising public switching systems. However, it is not restricted to this and, in fact, includes all other communications networks (satellite systems, private switching systems, ...) via which telecommunication is possible.

Patent Claims

1. A standby power supply, in particular for telecommunications terminals, comprising:
a base unit (1) for producing a link to a communications network (KN);
a power supply unit (6) for supplying power to the base unit (1) during mains operation;
at least one mobile part (2) with an associated mobile power supply unit (EM) for producing a link to the base unit (1); and
a standby power supply unit (NSV) for supplying standby power to the base unit (1) during standby operation, with the standby power supply being drawn from the mobile power supply unit (EM) for the at least one mobile part (2) by the standby power supply unit (NSV),
characterized in that a part (L1,L2) of the power supply unit (6) represents a DC-isolation unit for the standby power supply unit (NSV) the standby power supply unit (NSV) has an operating mode detection unit (EE), which detects each operating mode,
in that the standby power supply unit (NSV) has a DC/AC inverter unit (Q_1, L_1, L_2) for converting a DC voltage from the mobile power supply unit (EM) to an AC voltage for supplying standby power to the base unit (1), and
in that the standby power supply unit (NSV) has a control unit (SE) for controlling the DC/AC inverter unit as a function of the detected operating mode.

2. The standby power supply as claimed in patent claim 1,
characterized in that the mobile power supply unit (EM) represents a rechargeable energy store
and
the base

unit (1) has a charging interface (3) for charging the mobile power supply unit (EM) during mains operation, with the charging interface (3) allowing the

mobile power supply unit (EM) to discharge during standby operation.

3. The standby power supply as claimed in patent claim 1 or 2,
characterized in that the power supply unit (6) has a mains switching unit (RE) which allows disconnection from an electrical mains system (EN) during standby operation.

4. The standby power supply as claimed in patent claim 3,
characterized in that the mains switching unit (RE) is a latching relay.

5. The standby power supply as claimed in one of patent claims 1 to 4,
characterized in that the standby power supply unit (NSV) is provided in the mobile part (2) and in the power supply unit (6).

6. The standby power supply as claimed in one of patent claims 1 to 5,
characterized in that the mobile part (2) is a cordless telephone with an integrated hands-free device.

7. A method for providing a standby power supply, in particular in a telecommunications terminal, having a base unit (1) for producing a link to a communications network (KN);
having a power supply unit (6) for supplying power to the base unit (1) during mains operation;
having at least one mobile part (2) with an associated mobile power supply unit (EM) for producing a link to the base unit (1); and

having a standby power supply unit (NSV) for supplying standby power to the base unit (1) during standby operation, with the standby power supply being drawn from the mobile power supply unit

(EM) for the at least one mobile part (2) by the standby power supply unit (NSV),
characterized by the following steps:
the base unit (1) is DC-isolated from the mobile part (2),
standby operation is detected by means of an operating mode detection unit (EE),
an AC voltage is produced from a DC voltage (VCC_{MT}) in the mobile power supply unit (EM); and
the AC voltage which is produced is transferred as a standby power supply for the base unit (1).

8. The method as claimed in patent claim 7,
characterized by the following step:
the base unit (1) is electrically isolated from an electrical mains system (EN) during standby operation.

9. The method as claimed in patent claim 8,
characterized in that the electrical isolation is produced in the power supply unit (6).

GR 99 P 2581

Abstract

Standby power supply and an associated method

The invention relates to a standby power supply and an associated method, in particular in a telecommunications terminal, in which a standby power supply unit (NSV) derives a standby power supply for a base unit (1) from a rechargeable energy store (EM) in a mobile part (2). This results in a standby power supply, which is not only cost-effective but also saves space, in a telecommunications terminal.

Figure 3

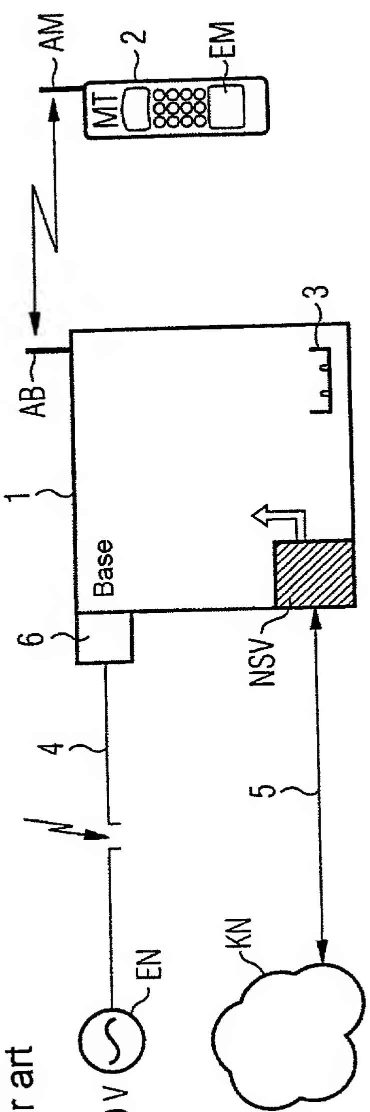


FIG 1 Prior art

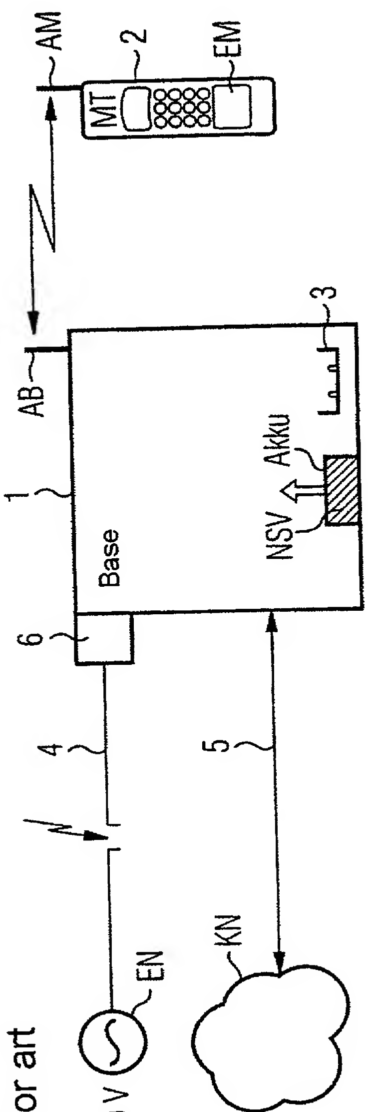
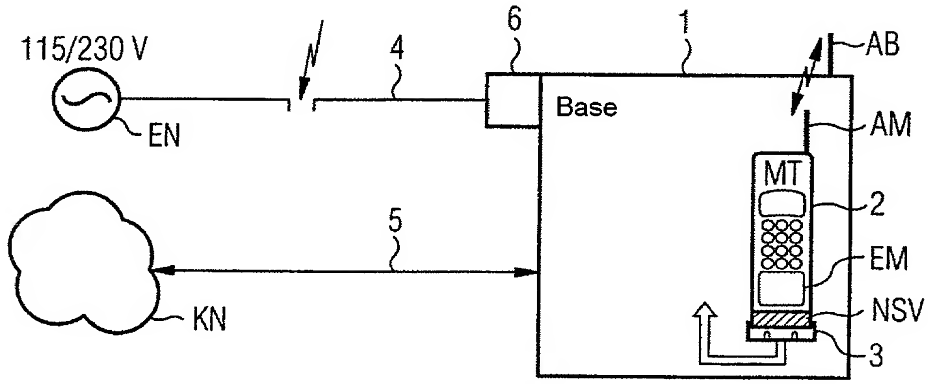


FIG 2 Prior art

FIG 3



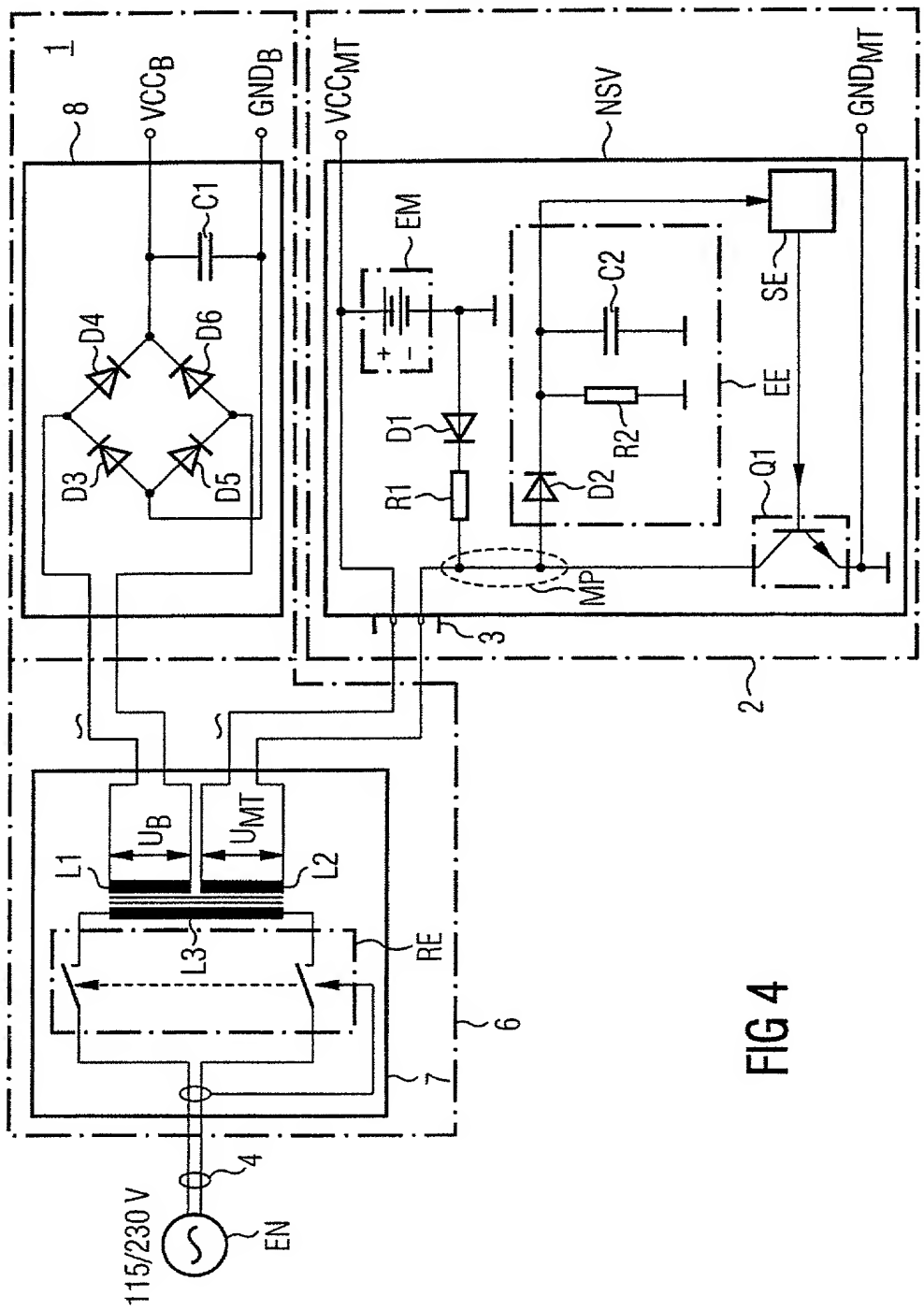


FIG 4

Declaration and Power of Attorney For Patent Application
Erklärung Für Patentanmeldungen Mit Vollmacht
German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Notstromversorgung sowie dazugehöriges Verfahren

deren Beschreibung

(zutreffendes ankreuzen)
☐ hier beigefügt ist.
☒ am 17.08.2000 als
PCT internationale Anmeldung
PCT Anmeldungsnummer PCT/DE00/02794
eingereicht wurde und am _____
abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Back-up electricity supply and method thereof

the specification of which

(check one)
☐ is attached hereto.
☒ was filed on 17.08.2000 as
PCT international application
PCT Application No. PCT/DE00/02794
and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign appplications
Priorität beansprucht

			Priority Claimed	
19938997.7	DE	17.08.1999	☒	☐
(Number)	(Country)	(Day Month Year Filed)	Yes	No
(Nummer)	(Land)	(Tag Monat Jahr eingereicht)	Ja	Nein
			☐	☐
(Number)	(Country)	(Day Month Year Filed)	Yes	No
(Nummer)	(Land)	(Tag Monat Jahr eingereicht)	Ja	Nein
			☐	☐
(Number)	(Country)	(Day Month Year Filed)	Yes	No
(Nummer)	(Land)	(Tag Monat Jahr eingereicht)	Ja	Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35. United States Code. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occured between the filing date of the prior application and the national or PCT international filing date of this application.

PCT/DE00/02794	17.08.2000	anhängig	pending
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date D, M, Y) (Anmeldedatum T, M, J)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)
_____		_____	
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date D,M,Y) (Anmeldedatum T, M; J)	(Status) (patentiert, anhängig, aufgeben)	(Status) (patented, pending, abandoned)

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

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Unterschrift des Erfinders Datum: Matthias Lungwitz 2002-02-05	Second Inventor's signature Date
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(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).